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Preparation and reversible aggregation of human cells encased in biocompatible polysaccharide shell

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Abstract

A deposition of cationic (chitosan) and anionic (alginic acid) polysaccharides onto the surface of normal and cancer human cells was studied with the use of dynamic light scattering. A method for preparation of multilayer polymeric shell by means of electrostatic adsorption of polysaccharides onto cell plasma membrane has been proposed. According to confocal microscopy, the polymeric shell evenly covers the cell and is 1-5 μm in thickness. Under experimental conditions, the modification with polysaccharides inhibits human skin fibroblasts growth but does not exhibit cytotoxicity to HeLa cells. We developed an approach to controllable and reversible aggregation of modified cells by their cross-linking in the presence of calcium ion. Resulting aggregates have spherical shape and the size of 100-500 μm. Proposed approaches and methods represent an alternative to cell microencapsulation technique and are of interest for the development of three-dimensional cell models and their delivery in vivo.

Keywords

Cell microencapsulation, Cell spheroids, Plasma membrane, Polysaccharides, Tissue engineering